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SEED  
PEAS  
FOR  
THE  
CANNER



**I**N NO OTHER CROP-GROWING INDUSTRY is confidence between the seedsmen and the growers of greater value than in that of growing canning peas. It is with the belief that an intelligent understanding of the difficulties of the situation is the only true basis of confidence that this bulletin is written.

Whenever canners are getting unsatisfactory stocks of canning peas they should determine what methods the seedsmen are using who furnish them with seed. Occasionally unexplainably bad stocks occur that cause a loss to both seedsman and canner. However, methods of producing satisfactory stocks of seed are well known, and the cost of production is not prohibitive. It is therefore recommended that canners buy on the basis of low-rogue content.

Seedsmen should not handle peas the stocks of which they do not control, and canners should buy only from seedsmen who control and carefully guard their seed stocks. When it is necessary for a seedsman to purchase from another seed company the transaction should be fully explained to the canner.

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# SEED PEAS FOR THE CANNER

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**P**EAS, which are of European origin, were brought to North America by the first immigrants and are now grown practically everywhere in the United States as a home-garden crop; they are also important in market gardening, truck farming, and canning. For a while canning peas were of relatively much greater value than market-garden peas, but at present the value of green peas shipped in the pods and frozen shelled peas exceeds that of the canned product.

Dry peas are either smooth or wrinkled, and for cultural and culinary purposes these groups vary in much the same way as corresponding groups of Indian corn. Under some conditions smooth-seeded peas appear to be more hardy than wrinkled varieties. The popularity of smooth-seeded peas in spite of rather poor quality is probably due to the greater utility of one variety of smooth peas (Alaska), since they can be used for splitting (soup), forage, and green manure, as well as for canning. The wrinkled sorts are spoken of by canners as "sweet peas", just as wrinkled corn is called "sweet corn." Most present-day varieties of peas have white blossoms, as do all garden sorts used for shelling. Some field varieties have blossoms of various shades of purple.

Peas vary greatly in character of vine, from dwarf through semi-dwarf to tall. The shortest varieties are but little over a foot high, the mediums being from 2 to 3 feet, and the tall varieties reaching 10 feet under good culture. They differ also in the color of the split seed, some being green and others yellow. Field peas have been thought by some botanists to belong to a different species from garden peas and were called *P. arvense*, the garden pea being *P. sativum*. This distinction is now generally abandoned, and the latter name applies to all peas, whether used for field or garden purposes.

## FIELD PEAS

A "field pea", as the term is here used, is a pea grown for use as human or animal food in its dry state, or grown either alone or with

some other crop for forage or green manure. All the peas in the old botanical group of varieties called "field peas" bear colored flowers. There has been a decided tendency in this country to abandon the culture of colored-flowered sorts, so that at present but few are grown in the United States or Canada. The name "Canada field pea" is variously used in different regions, sometimes to indicate a specific variety, but often to include all field sorts.

Dry peas are sold extensively in Europe as human food. Since about 1930 there has been a very great increase in the quantity of dry peas sold for human food in the United States. Most of such peas are used for soup prepared from split peas from which the seed coat has been removed. As the seed coat is difficult to remove from wrinkled peas they are never used for splitting. However, in some years there are rather extensive imports of dimpled peas (Harrison Glory) from the Orient for splitting. Most of the dry peas sold for splitting are green-seeded Alaskas, but there is a very definite demand for some yellow-seeded splits, such as First and Best. Split peas are graded according to size, and somewhat higher prices are received for large sizes. Blue Bell and White Marrowfat are the most popular large-seeded varieties, with green and yellow seeds, respectively.

Although many white-flowered peas are grown for green manure and forage, the most popular variety for these purposes is the colored variety, Austrian Winter. Seed companies producing seed peas for canners have been attempting to eliminate colored-seeded varieties from various growing sections, because the admixture of even a few colored seeds in a strain of seed peas may result in serious difficulties for the canner. Fifteen years ago Bangalia peas were commonly found mixed with Alaskas grown in the Palouse area south of Spokane, but at present it is difficult to locate even a 50-seed sample of Bangalias. All purple-flowered peas have some color in the seed coat, and the flavor is distinctly strong as compared with common white-flowered peas with colorless seed coats.

Several high-yielding dwarf, early strains of peas have been developed to take the place of Alaska, but these have not been generally successful, probably owing to difficulties in harvesting dwarf varieties on poor soil where vine development is slight. Surpluses of wrinkled varieties such as Admiral may be used for forage or green-manure plantings. Blue Bell is the only common dwarf field pea. It is sufficiently late in season so that pods are borne high enough above the ground to cause no difficulty in harvesting on infertile soils.

#### THE RELATION OF FIELD PEAS TO CANNING PEAS

When a seedsman signs a contract with a canner, for example, for 20,000 pounds of Alaska peas and 80,000 pounds of Perfection, he usually does so with the unexpressed decision to plant proportionally more Alaskas and less Perfections than the contract for seed indicates. The reason for this situation is complex. If the seedsman finds himself with a surplus of Alaska peas they are readily sold for splitting or other uses at a price sufficiently high so that he does not sustain a loss. On the other hand, if he has a surplus of wrinkled peas he will probably have to dispose of them as ground

feed for livestock at a decided loss from his growing-contract price. Consequently, seedsmen are inclined to plant their acreages in such a way that they have just about enough wrinkled peas and a surplus of Alaskas. Only in 1 year out of 3 or 4 is the average seedsman able to deliver 100 percent of his contracted wrinkled peas. If the canner is fortunate he may be able to purchase sufficient spot peas (purchased on short notice on the open market) of the wrinkled type to plant in the proportions that he has planned. In the long run, however, when canners find one seed company making 80- to 90-percent deliveries on wrinkled peas, the other seed companies are also making short deliveries so that no spot peas are available. There seems very little remedy for this situation, since it would be of little value to the seedsman to gain the good will of the canners by deviating from accepted seed-growing practices to the extent that his bankers were no longer willing to finance him.

#### CANNING PEAS

Peas have been used for canning for as long a time as any vegetable. The beginning of the industry in this country probably was at Baltimore, Md., in the decade before the Civil War. At first, peas were bought in the pods in the city markets, shelled by hand, and placed in cans. About 30 years later, a machine was invented in France for podding or shelling the peas. This very greatly increased the capacity of the factories, but peas were still bought in the pods. During the decade beginning with 1890 this podding machine was adapted and improved for handling the peas, vines and all, as cut in the field, thus eliminating a great amount of hand labor in picking the pods. This machine is now called a viner and is probably the most important single invention among the many used in the pea-packing industry.

In the market-garden sections culls are sometimes vined and canned, or if the pods are badly spotted by *Ascochyta* blight or other diseases, so that the crop would be unprofitable to pick by hand, the entire crop may be cut and vined for canning. The amount of cull peas that is canned from market-garden crops depends somewhat on the size and price of the canning crop. When the prices are low and an abundance of canned peas are available relatively few cull peas from market-garden crops are used in canneries.

#### REQUIREMENTS FOR A CANNING PEA

A good canning variety must have the following qualities:

(1) It must be productive. This will include its being hardy if it is to be grown in the southern portion of the pea-canning region, and will exclude very dwarf types.

(2) All plants must develop uniformly.

(3) All pods on individual plants must be in usable condition at one time; that is, none must be too ripe or too immature. This can be influenced somewhat by the rate of seeding. This requirement tends to exclude varieties with too great a length of vine.

(4) The seeds should remain green after being processed. This requirement relates to appearance only, since it is not claimed that

the green-seeded peas are of higher quality; in fact the reverse claim is often made. This almost eliminates the yellow-seeded peas, because abuses in handling and processing show up very readily in the product from yellow-seeded varieties. Many yellow-seeded varieties show a greater variation in coloring than do green-seeded varieties. Many seeds of the common yellow-seeded varieties show a gradation from yellow to green in the dry seeds, and all-yellow strains are much sought.

(5) Within the list of varieties possessing the four characters enumerated, high quality is given preference.

(6) A variety must be relatively early. Only a very few canning peas are grown under ideal conditions, so that a successful variety often owes its popularity to escape from insect or weather damage. Wisconsin with a severe climate, with wide fluctuations in heat and cold, still produces about 40 percent of the canning peas grown in the United States. Under such conditions Perfection (which begins blooming at the fourteenth node) rapidly replaced Horsford (sixteenth node), and many canners are now insisting that for Perfection to be satisfactory it must be still earlier.

Before the advent of the viner the second and third requirements were not so important as now since the pods were hand-picked. The viner, therefore, has had a decided influence on the list of varieties of peas used for canning.

During 1917 the Food Administration compiled statistics on canning varieties. These data are shown in table 1, together with an estimate for 1935 which is based on conversations with seedsmen and canners, and on some personal observations.

TABLE 1.—*Percentage of canning peas by groups and by varieties*

Variety	Estimate by—		Variety	Estimate by—	
	Food Administration, 1917	Author, 1935		Food Administration, 1917	Author, 1935
Smooth peas: Alaska	55	50	Wrinkled peas—Continued.		
Wrinkled peas	45	50	All others	2	4
Horsford group	28	30	Prince of Wales (Green Giant)		
Horsford	18	1	Profusion		
Advancer	8	(1)	large-seeded		
Little Gem	1	(2)	Senator		
Perfection (Davis) <sup>1</sup>	1	29	Onward		
Admiral (yellow)	13	1	Thomas Laxton		
Admiral (green)		5	Small-seeded varieties		
Surprise <sup>2</sup>	2	10			1

<sup>1</sup> Cannot be distinguished from Perfection.

<sup>2</sup> Trace only.

<sup>3</sup> Includes wilt-resistant strains.

<sup>4</sup> Includes Wisconsin Early Sweet, Mardelah, and other hardy or wilt-resistant wrinkled peas from crosses of Alaska and Surprise.

The Alaska holds its predominant position in the list for several reasons. The first reason has been explained in connection with the use of Alaska as a field pea; that is, supplies of Alaska that would ordinarily be used for field purposes are always available to substitute for wrinkled peas when there is a short crop of the latter. Up until the advent of wilt-resistant types of Surprise, Alaska has had no

hardy competitor. Although these newer strains of Surprise do not seem to be quite as hardy as Alaska, their high quality, together with fair hardiness, has caused them to be quickly accepted. Toward the southern limit of pea canning in the United States (Maryland and surrounding States) Alaska is still canned almost to the exclusion of other varieties. Probably New York has gone farther than any other State in replacing Alaska with Surprise. No matter what competitive varieties are developed, it would seem that Alaska or some similar variety will have an important place for a long time to come because of the demand of cafeteria and lunch-room proprietors for a tough pea that will stand up well on a steam table.

The most striking thing about the 1935 figures in comparison with those of 1917 is that within 18 years the Horsford variety has almost disappeared and the Davis Perfection has almost completely displaced both Horsford and Advancer. In breeding for fusarium wilt resistance some additional hardiness appears to have been introduced into the Perfection variety.

Green Admiral was not known in 1917. Although it is not quite so hardy as Yellow Admiral, it has now become more popular on account of the seed color. The percentage of Admiral grown varies considerably. After a bad year with root rots or drought there is usually quite a demand for Admiral seed, but with a few normal years its popularity wanes. Although Admiral is superior to Alaska in quality, it is inferior to Surprise or Perfection.

An attempt has been made to meet the competition of market-garden peas shipped in the pods with ice, or of shelled frozen peas, by canning large wrinkled seed peas ungraded as to size but fancy in quality. That this has not been entirely successful is now evident since the large ungraded sweets are now available in grades as low as Standard.

Before the advent of the viner, many other varieties were grown for canning such as the Telephone, White Marrowfat, and Kentish Invicta. The Kentish Invicta has been replaced by the Alaska, and the other two varieties mentioned were too long in vine and ripened through too long a season to be adapted to machine handling and so have dropped out.

The question is sometimes raised why some of the green-seeded, white-flowered varieties of field peas would not make good canning sorts. The varieties most frequently suggested for this purpose are the Prussian Blue and Blue Bell, these two being almost identical. The answer is easily given. They do not have any of the advantages of the Alaska for present-day processes. They would be too late for the southern tier of pea-canning States, southern Illinois to Delaware, and would shorten the season for a succession crop on the same ground. They do not mature their crop all together, so that they would have all stages from blossoms to dry peas on the plant at the same time. This would give an unsatisfactory crop of peas, since they would be difficult to grade. Moreover, for the States from Wisconsin to New York they would not extend the canning season, but would mature with the more valuable wrinkled varieties. Thus they lack some of the main characteristics that make the Alaska a desirable canning sort. It is difficult to see any reason for attempting to grow these varieties for canning anywhere. Attempts at canning Blue Bell

in Wisconsin resulted in a pack of very low grade on account of meali-ness and cracked seed coats, although the flavor was satisfactory.

In years when supplies of seed of wrinkled canning varieties are short the seedsmen may offer various market-garden varieties to canners to help fill the requirements. If such varieties are considered within their limitations they may be quite useful. A few such varieties and their characteristics are listed:

Little Marvel (Nott Excelsior) possesses excellent quality and is a few days later than Surprise. The vine is short, so it should be planted on fertile soil.

Thomas Laxton, Gradus, World Record, and Stella are all of excellent quality, and a few days later than Surprise. Vines are taller than Surprise, so they should be planted on only moderately fertile soil lest trouble be experienced in vining.

Daisy (Dwarf Telephone), Stratagem, and Onward possess excellent quality, and are a few days later than Perfection. They are large-seeded but cannot be depended on to yield as heavily as Perfection.

#### SEED-PEA GROWING

The production of seed peas for the canning and market-garden trade is probably the largest single-crop seed-growing enterprise in the United States. It has a very high crop risk and has been very migratory.

It began in Canada; later New York became the center of the industry, which steadily moved westward through Michigan into Wisconsin. That State for a long time was the main section for seed peas and is still an important producer. From Wisconsin the industry has continued to move westward, and nearly every section where peas might be grown, irrigated or not, either is now producing seed peas or has abandoned their cultivation after trial. California is one of the most recent sections to grow seed peas. They are grown there as a winter crop. The larger seed-growing companies are searching continually for new areas. At present no new areas for growing seed peas are being developed, but small districts adjacent to well-developed large areas are frequently being added. There is sufficient acreage of good seed-pea producing soil to furnish the country with many times its present requirements of seed peas. Although relatively great shifts of acreage may occur, the desire of the seedsman to diversify his risks is now a retarding factor in area changes. Diseases, insects, weather, and the economic relations of the crop are all involved when a seedsman is considering just where to grow his crop for a given year or for a number of years.

The seed-growing industry has been confined to northern latitudes or high altitudes except in the case of California, where peas are grown mostly as a winter crop. Statistics on the production of dry peas are rather meager; at present there are none available on seed-pea production. It is impossible, owing to methods of handling, to separate seed for canning from seed for market-garden purposes in the estimates of seed production for 1933. The year 1933 was taken as a year of low production, but the writer's estimate of seed

produced was 100,000,000 pounds. Through the courtesy of a large seed company the following estimates for 1937 have been obtained:

	Pounds
Snake River Valley of southern Idaho	32,000,000
Palouse area of eastern Washington and northern Idaho	23,000,000
Bonners Ferry, Idaho	3,000,000
Western Washington, Ellensburg, Mount Vernon, and Puget Sound	2,000,000
Western Montana, Arlee, Hamilton, Kalispell, and Livingston	10,000,000
Gallatin Valley, Mont.	7,000,000
Billings, Bridger, and Red Lodge, Mont., and Great Basin of Wyoming	7,000,000
Salinas, Sacramento, and King City, Calif.	9,000,000
 Total	 93,000,000

If to this total is added several million pounds produced in Mexico and Europe from seed stocks owned or controlled by American seed companies and the seed grown by canners and farmers the quantity of seed would certainly exceed 100,000,000 pounds. In other years seed production may have been as high as 125,000,000 pounds.

During the last few years there has been some tendency to shift production from southern Idaho to the Sacramento section of California. During the same time production in the Palouse area has increased in relative importance with respect to the total.

Peas for seed are usually sown with a grain drill whether for dry land or irrigation at rates varying from 100 to 240 pounds per acre. Some experimental work has been done in Idaho and New York showing that graphite used in the drill with the peas may reduce cracking with a consequent increase in stand. In California, seed peas are generally grown in rows with rates of planting varying from 40 to 150 pounds per acre.

Peas are often grown by seedsmen for 2 or 3 years or even longer on the same fields with increasingly good results, but serious danger of disastrous diseases and volunteers accompanies this practice.

Although there is not at hand much exact evidence, it seems doubtful whether the irrigation of a seed crop has any effect on the canners' crop of peas grown therefrom.

In determining the size of his plantings a seedsman estimates yields at from 600 to 1,200 pounds per acre. Dry-land sections usually produce a smaller yield per acre but from a lighter rate of planting. Yields of 1,500 to 3,000 pounds have been obtained from plantings of peas in rows on fertile ground at a rate of 25 to 50 pounds per acre. When important seed stocks are to be increased, seedsmen frequently estimate a return of 25 to 100 times the seed planted. They may grow the increase plots in Mexico or other winter producing areas so as to obtain two crops within a year. During the last 10 years the general tendency has been to decrease the rate of planting on common seed stocks, with no decrease in the resulting yield. Even in spite of this tendency the proportion of land devoted to seed production in relation to canning acreage is greater for peas than for any other vegetable reproduced by seed. The average seedsman's acre of peas probably provides a supply sufficient for about 4 acres of canning peas. More attention to soil fertility and farming practices in many seed-growing areas would result in much higher yields per acre.

Seedsmen can do a great deal to increase the return of peas in a given community by contracting with only the best farmers and by demonstrations of better yields at proper seeding rates.

#### MIXTURES AND ROGUES

To make an acceptable stock for the canner, peas must be uniform, and the more nearly all the plants of any lot approach the type of the variety the better and the more salable the strain will be. Seedsmen must guard this uniformity from various dangers, some of which are as follows:

**Mechanical mixtures:** It requires great vigilance to prevent mixtures of this kind. Some seedsmen furnish inspectors to make sure that farmers' drills are free from other peas and that threshing machines are properly cleaned before seed peas are threshed. Modern warehouse construction has made it possible to eliminate much mixing that formerly took place there.

**Volunteer plants:** If field peas have been grown on a piece of land, seed will often lie in the soil over winter and will appear as a volunteer crop in a following crop of seed peas. This may occur even if one or more crops of small grain have intervened between the crop of field peas and the seed peas, as the volunteer peas will grow, ripen, and reseed naturally in the grain. The wrinkled varieties of peas will rarely live over winter in this way. Seedsmen have found it increasingly difficult to avoid areas in which large acreages of field peas are grown. To avoid mixtures seedsmen usually stipulate in their contracts with farmers in such areas that no peas other than contract seed peas are to be grown on the farm and that peas must not be planted on ground seeded to peas the previous season.

**Rogues:** The most difficult mixtures to control are those spoken of as rogues. Often rogues are degenerate in character and have at least the appearance of being a return toward an unimproved type of pea. Not all varieties are equally liable to produce rogues, and some varieties rarely show them.

To the seedsmen the term "rogue" often refers to any undesirable type found growing in his fields, and the process of removing these plants is called "roguing." These terms are applied to other seed crops as well as peas. Usually seedsmen distinguish between mixtures of recognizable varieties and rogues. Rogue has been used in technical publications in England and in this country to indicate a particular degenerate type of pea, called by American seedsmen "rabbit-ear rogues." Rogues, then, may be degenerate peas of uncertain origin, reversions to type, or crosses. Field crossing in peas varies a great deal from variety to variety and from season to season, but the careful seedsman is willing to take precautions against it by isolating pure-line stocks of Alaska, Surprise, and Perfection and by separating other less prominent varieties by rows of corn or other crops. Roguing, or the removal of aberrant plants from a stock, must be done when the particular variation being sought for can be most plainly seen. This basis of rejection may depend on the vigor of the plant; its habit, whether branching or not; the shape, size, or color of the leaf; the color of the blossom; and the size, shape, or curvature of the pod, or whether the pods are produced singly or

in pairs on the blossom stems. Rabbit-ear rogues are found in some of the most highly developed wrinkled peas and have much smaller, narrower stipules and leaves than the varieties in which they occur. These have been studied in England and North America, and it has been found that such a rogue apparently never reproduces the type of the parent variety. Rabbit-ear rogues are of very rare occurrence in canning varieties and are of no concern to the canner unless he is using a market-garden variety like Thomas Laxton or Gradus. Such rogues are so rare in the common canning varieties that many seedsmen believe they do not occur.

The time when roguing can best be done will vary. Some rogues can be seen best when the plants are small, others only when the crop is ripening or at some stage between these two conditions. Some rogues will be readily seen, and others will require long experience to find. The most difficult of all rogues to remove is probably the one which differs only in pod characters. Some crops must be rogued at two different times.

Seedsmen have found that the best way to avoid the necessity for roguing is to start out with single plants typical of the variety and to increase these pure lines in places isolated from other strains and varieties. After a strain has been increased to the extent that it is available for distribution it is of course impossible to keep it entirely isolated, but isolated pure lines are kept coming along to replace the original pure line when it begins to show evidence of contamination with rogues. In the long run this method is cheaper for the seedsman and much more satisfactory to the canner than roguing. Rogues occurring in pure lines may be due to sports (mutations) or may arise from mechanical mixtures.

The seriousness of rogues depends upon their nature and on the variety in which they occur. For instance an Alaska rogue occurring as one plant among 1,000 Perfection plants would result in serious loss of quality in the canned product, whereas the same Alaska rogue (or a Perfection rogue) occurring in the same proportion in an Alaska stock would be scarcely noticeable. Various seedsmen and canners have set up standards for rogues. These standards, which are somewhat flexible but indicate what both seedsmen and canners may expect, are given in table 2.

TABLE 2.—*Standards for occurrence of rogues in pea seed stocks*

Variety	Seedsmen's basic stocks; rogues not to exceed 1 plant in— <sup>1</sup>	Canner's stock; rogues not to exceed 1 plant in— <sup>1</sup>	Common rogue types
Perfection.....	20,000	1,000	Tight pods; fifteenth- to sixteenth-node bloom.
Alaska.....	10,000	200	Tight pods; long peduncles; tenth- to twelfth-node bloom.
Surprise.....	5,000	500	Crooked pods; tenth- to twelfth-node bloom.

<sup>1</sup> Alaska or early varieties mixed with Perfection, not to exceed 1 plant in 100,000.

Not all smooth seeds occurring in Perfection will give rise to rogue plants because under some conditions the wrinkling of the Perfection seeds is obscured. Some strains of Alaska are such a

diverse mixture of good or fairly good types that it is difficult to decide exactly what to call a rogue. This is especially noticeable in shape of the point of the pod, length of peduncle, and tightness and size of pod. When canners are interested in canning fancy products, pure lines are likely to be insisted upon, and the concept of what constitutes a rogue is adhered to rather strictly; whereas those canners interested in canning mainly standard or choice products are not so particular about the occurrence of border-line rogues. On the whole seedsmen find considerable difficulty in holding to as strict standards for Surprise as for Perfection. However, reports on new and hardy strains of Surprise indicate that much of this difficulty has been overcome.

As might be supposed, not every laborer can make a satisfactory member of a roguing gang, since close observation and an ability to see very slight differences in plant characters are required. Where possible, men who have worked at roguing for more than one season are engaged. Recently such experienced men have been very difficult to obtain.



FIGURE 1.—A small crew of seven men roguing a field of pens sown with a grain drill. The foreman is back of the line, where he can find rogues missed by the men.

A roguing gang usually consists of 12 to 15 men, under a foreman (fig. 1). A 15-man crew is arranged for work as follows: 12 of the men are placed in line, so that when their arms are extended the finger tips of adjoining men will touch. They proceed straight across the field with stakes as guides, keeping the proper distance apart. Two of the most experienced men are placed in a second line, one to follow each six men in the front line and to get any rogues which they miss. Lastly, the foreman ranges back of the whole gang, advising and explaining what is to be pulled and removing any rogues he finds. Sometimes the gangs can work only with the sun at their backs, so as to get the best lighting. When pulled, the rogues are carried out of the field, and are preferably fed to stock, so as to prevent any chance of the seeds being returned to the field. In work requiring the most care, a gang of 15 men can cover only 15 acres per day.

There is also another resource left to the seedsman for purifying his seed stocks. This is his warehouse machinery. Sieves in a fanning mill may be used to separate peas too large or too small for the variety, and any variation which shows in discernible seed characters may be picked out on the picking table. In the case of some varieties the seeds of most rabbit-ear rogues may readily be removed by hand-picking.

#### ROGUES OF ALASKA PEAS

In the case of the Alaska pea there are various stages in divergence from type. E. J. Renard (formerly geneticist of the Wisconsin Agricultural Experiment Station)<sup>1</sup> has indicated that many of these Alaska rogues arise from crosses and that divergences from type are not necessarily very distinct. The only practical solution of the rogue problem seems to be pure lines increased under such conditions that natural crossing is precluded. Several such pure lines should be started, and any that show rogues in the first few generations should be discarded. By careful growing on fertile land and by greenhouse increases of early generations and winter increases it is now possible to increase from single plants to carload lots in less than 3 years. After a seed company has initiated a system of pure lines it can undoubtedly furnish replacement lines without greenhouse or winter increases. Alaska rogues are so variable in type that generalizations are somewhat difficult. However, the most conspicuous types and probably the most common have longer vines, flower at a higher node (tenth to twelfth), and are usually much more productive than are normal Alaska plants.

#### SEED-PEA FIELD MANAGEMENT

The most careful seedsman will put his main emphasis on his stock seed, keeping that as pure as his best vigilance can make it. Then, if there are no volunteers to be pulled out it is not necessary to go over fields the seed of which he expects to sell. Indeed, if he attempts to rogue his whole commercial planting there will be at least a tendency toward lax roguing on his stocks, and if his commercial plantings really require roguing it shows lack of care in handling his stock seed. Because of frost or other injuries sometimes the first blossoms on a plant are killed. Some such plants are stimulated and produce vines resembling rogues and the peduncles may be lengthened and the pods that do set are reduced in size.

Some canners have believed that if the seed furnished were produced on plants growing in exceptionally fertile soil, they could expect more trouble with rogues. There is no evidence of any kind for this belief. It is certainly best for the canner that the seedsman confine his attention to his seed stocks rather than depending on roguing commercial-seed fields, since he can thus deliver the best and most even seed. There is a widespread demand on the part of the canner that he be sold seed from rogued fields. This demand is based on a misconception, for which in all probability both canner and seedsman are to blame. Also the seedsman will very rarely sell

<sup>1</sup> Wisconsin Station Research Bulletin 101, Origin and Nature of Rogues in Canning Peas.

any of his stock seed, and it is best for the canner that he should not. If his stock seed has had sufficient care it can only be sold at an advanced price. Keeping in mind the very high ratio of seedsmen's plantings to canners' plantings, 25 percent, it is easy to see that the seedsman will have use for all the stock seed he can properly rogue.

#### INDIVIDUAL-PLANT SELECTION

In occasional years of near crop failure the seedsman may be glad if he is able to retain his stock seed. With very short crops roguing is not possible; but after 1 or 2 such years, when there is a good year, the roguing will be very heavy. The best that can be done by roguing is to attain approximate purity, since some undesirable plants will always escape. The most efficient roguing usually succeeds only in holding the percentage of rogues to the same level; hurried roguing is a waste of time and money. Seedsmen are finding that it is really good business to go back to pure lines increased from single-plant selections. Unfortunately there is a tendency for many seedsmen to lump together lines that look alike. On account of the limitations of observation this sometimes results in a very poor stock. It is quite useless to make single-plant selections unless very rigorous precautions are taken against natural crossing and against mechanical mixtures in threshing and cleaning. Pure-line stocks should be brought up continuously to take the place of those beginning to produce too many rogues.

#### FARMERS' STOCKS OF ALASKA PEAS

There is another and a very important point in connection with Alaska peas. The variety being smooth-seeded (usually slightly pitted) and in many ways very much like field varieties, makes a good field pea. Farmers in Wisconsin and in parts of the West have kept their own seed, growing it without roguing; in fact, for a field pea the more rogues a stock of Alaska has the better type it may be. These stocks may keep the name Alaska, but may have lost practically all their true Alaska plants. Stocks of this kind are to be found so variable that further study is necessary to determine whether or not they trace to Alaska. It is very difficult, if not impossible, to distinguish these spurious Alaska peas from the true variety by the characters of the ripe seed (fig. 2). They are, however, a recognized field pea, often under the name Alaska, in the sections where grown and, moreover, are distinct from other green-seeded field peas, being earlier than Prussian Blue, Blue Bell, or Scotch Blue, which are the varieties most like them in the dry seed. Being grown as field peas and carelessly threshed with custom machines, these stocks become mixed with other field types.

If these mixtures happen to contain varieties with colored flowers, the peas from these will turn dark on processing when canned and will darken the liquor in the cans. A small-seeded, colored-flowered field variety called Bangalia (Bangalia seeds are in the mixture shown on the cover) has been so mixed into Alaska and has caused heavy loss. For the last 10 years Bangalia peas have been very little grown and no complaints have been made by canners against this particular

mixture. Splitters of dry peas report that pure-line Alaskas are easier and cheaper to split than are ordinary commercial strains and produce a more uniform product. Under these circumstances it seems probable that eventually farmers growing peas for field purposes only may insist on pure lines for their plantings.

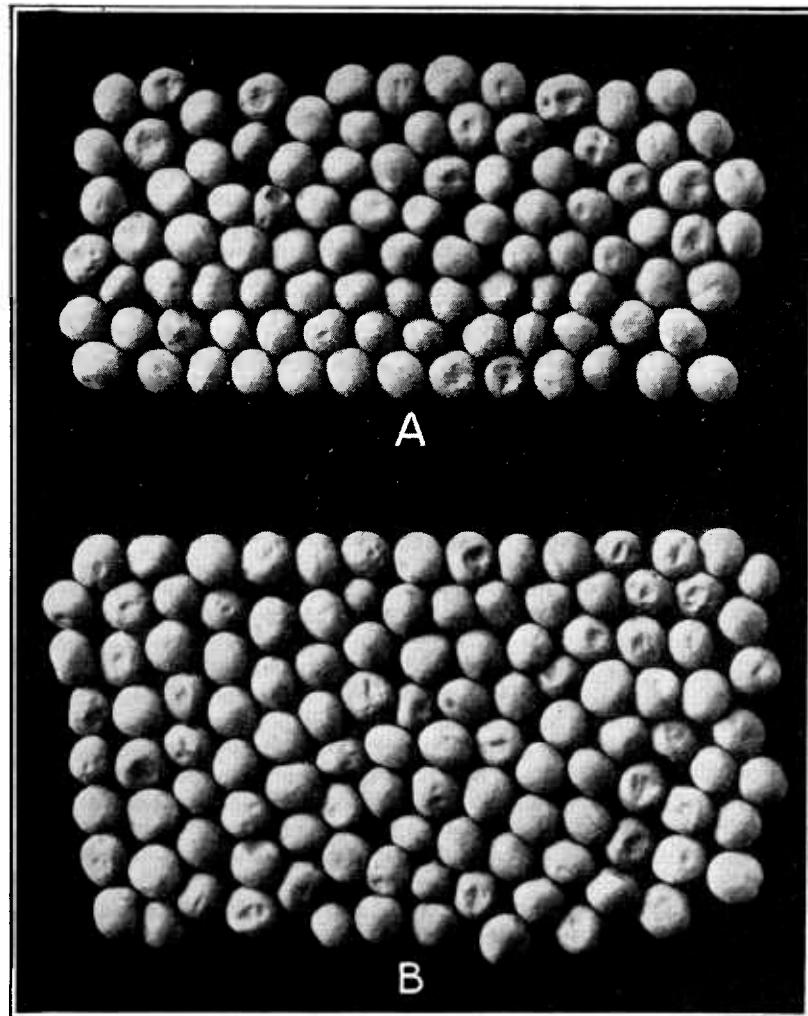


FIGURE 2.—Genuine and spurious Alaska peas. Growing tests have shown that A produces a good, even strain of the Alaska variety, while B produces a large proportion of late, long, spurious Alaska plants. This shows the practical difficulty in recognizing the strain from seed samples.

If a canner has been supplied seed by a seedsman careless enough to have purchased his stocks from a farmer who grows the type of so-called Alaska, previously described, trouble may be expected from spurious Alaska stocks which may be much later than Alaska or so mixed that the canning of good-quality peas is impossible.

## DAMAGE DONE BY SPURIOUS ALASKA PEAS

In sections where the Alaska is the only variety canned, the crop is off the ground in time for a succession crop, sometimes a canner's crop of sweet corn or dwarf lima beans. Late peas, if allowed to mature so as to be harvested dry, may defer the succession crop so long as to prevent its being planted. Even where the late peas may be off in time for planting the succession crop, the spurious seed very seriously discommodes the farmer, as the late plants throw his pea-harvest season into the time when all his labor is needed for wheat harvest or corn cultivation.

Being very long, heavy in vine, and late, the spurious Alaska peas do not ripen simultaneously and will rarely give more than a very small crop of peas usable for canning at any one time.

If mixed with purple-flowered varieties, some peas will darken on processing, and the liquor will be dark, so that the canned peas will not be salable. Late Alaskas are frequently off-flavor or very dark in color.

Most important of all is the loss of confidence and goodwill between the canner and his seedsmen. This is a loss which it may take years to repair and which cannot be estimated.

Alaska peas are now seldom sold to market gardeners since so many better varieties are available, but millions of pounds of farmers' strains (some spurious, some true) are packaged each year and sold to home gardeners under a diversity of fancy synonyms.

## PRECAUTIONS

Precautions against getting spurious Alaska seed are now seldom necessary, and the question narrows down to which seed company is furnishing the canner peas with the most consistently low rogue count. If a seedsman were guilty of delivering "farmers' strains" of peas to canners, he would deserve to lose all his canning-seed business. In the past many canners have tried to solve the problem of getting good seed by growing all or a part of their own seed requirements. It is very doubtful whether it is at all practicable for the canner in the southern part of Illinois, Indiana, Ohio, Maryland, Delaware, and New Jersey to grow his own seed. Some Wisconsin canners grow a part of their own seed. They rarely rogue, and they renew their stocks every 2 or 3 years from a seedsman. If it is not satisfactory they may can it rather than save it for seed. The regular occurrence of certain diseases in most canning sections makes this practice inadvisable. Most canners do not wish to become seedsmen, and most of those who have tried to become such have not been very successful. The best way for a canner to insure himself of a satisfactory seed supply would be to buy from reputable seedsmen on the basis of the rogue count. Percentage and types of rogues permitted might be specified in the contracts.

There have been seed-pea jobbers who have handled Alaska seed without controlling any stock seed of their own. At best this is a very risky business, since it is practically impossible to distinguish the Alaska variety by seed sample (fig. 2). The price of seed peas is a comparatively heavy item of expense in growing a crop, in comparison with other canners' vegetables, and it is natural that canners

should wish the price to be as low as possible for a good product. But under present conditions it is easy to push the bargain for seeds so far that it becomes a very bad one for both. Some few seedsmen see in the canner a man who looks only at the price he pays for his seeds, disregarding quality. Some few canners see in the seedsman or seed dealer a man intent only on making a sale, regarding the seed only as merchandise, with no care as to quality. There are possibly a few such canners and a few such seedsmen, but the number of each has been greatly overestimated, since both attitudes are very short-sighted from a business standpoint.

To a seedsman there are two all-important things—his stock seeds and the reputation based on those stocks. With no other crop does the purchaser have to depend more completely on the good faith and reliability of his seedsman than with peas. Therefore, in no seed enterprise is a reputation for uniformly good seed and honest dealings a greater asset to a seedsman. No seedsman can afford to buy Alaska peas on sample, since identification is uncertain and he has too much at stake in his reputation. No reputable seedsman will sell to canners for seed peas stocks of Alaska peas that he picks up on the dry-pea market.

The canner purchases in sufficiently large quantities to buy direct from the seed-growing seedsman, who should realize that the quality of the canner's product is very directly related to the quality of the seed from which he grows his canning crop. It is of course not for the canner to dictate to the seedsman just how he shall grow his crops; however, there are certain very definite criteria with regard to basic seed stocks and canners' stocks to which every canner has a right to expect the seed furnished by every seedsman to conform. If the seedsman is carrying out his growing correctly it can be determined by a simple rogue count. If unexplainably bad stocks occasionally occur, refunds are usually made to the canner.

During the last several years it has become customary for many canners to visit the western seed-growing areas to see for themselves the condition of the fields from which they expect to have seed delivered to them the following spring. On such trips it is well for canners to make note of the following details: How much pure-line (isolation) work the seedsman has in progress; and whether he has sufficiently diversified the risks by growing in various sections. The crew of field inspectors employed should be large enough to check up at planting and harvest with three or four inspections during the season. Contracts should be written with good farmers willing to grow only seed peas in adequate rotation. Roguing of any kind should seldom be necessary. Warehouses and mills should be so constructed that the mixing of one variety with another in cleaning, grading, hand-picking, and other operations would be highly improbable. Finally, of course, rogue counts of the fields inspected should be made and compared with rogue counts made on fields planted with the same stock for canning the next year. In making rogue counts it is well to determine the number of rogues in a thousand plants in 10 or 15 places in the field. For canners who find it impracticable to visit seed-growing areas, much of the desired information can be obtained by a well-written letter.

## DESCRIPTION OF ALASKA PEAS AND SPURIOUS FORMS

The true Alaska variety is described as follows:

Stem 2 to 2½ feet high, branching slightly or not at all; leaves medium size, light yellowish green in color; flowers white, usually solitary, beginning to appear at the eighth joint of the stem; pods straight and blunt, well filled with seeds, three to six to a plant; season very early, each plant ripening all its pods very nearly at the same time. Dry seed, green, may be all smooth, but typically shows many pitted seeds, these characters being apparently much influenced by climatic conditions. (See fig. 2, A.)

The following is a description of spurious Alaska peas:

They vary from the true Alaska variety, in that the stocks are usually mixtures, with few well-marked types. Most plants are later and taller-growing. Although rogue plants may flower at the same node as normal plants they typically flower from the tenth to fifteenth nodes and continue flowering for a long time if the weather permits. Peduncles (pod stems) long and slender. Pods variable in size, straightness, and tightness. In season plants vary from the season of Alaska to 12 days later. Seeds are ordinarily not distinguishable from Alaska, but some are larger, others smaller, and in a few cases the rogue seeds may be lighter or darker green in color.

## DESCRIPTIONS OF OTHER VARIETIES

Perfection typically blooms at the fourteenth node and under good growing conditions many peduncles produce two pods. Rogues are not as common in Perfection as in Alaska, but occasionally tall plants blooming from the twelfth to the sixteenth node and possessing long slender peduncles are found. Mechanical mixtures with early varieties are the main source of canners' complaints about seed stocks of this variety. Practically all the wilt-resistant strains of Perfection have come from pure lines and are reported to be producing very few rogues.

Surprise blooms typically at the eighth node and has been so non-hardy that it was of minor importance until after the introduction of hardy strains of it from crosses of Surprise with Alaska, like Wisconsin Early Sweet and Mardelah. The occurrence of later-blooming and of female sterile rogues is rather common. Mixtures of Alaska with Surprise are frequent and result in a serious loss of quality for the canner. Perhaps the best way to avoid Alaska mixtures with Surprise would be an agreement among seedsmen not to grow Alaska stocks in certain areas that they might set aside for Surprise stocks.

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